

**CLAIMS**

1. A method of generating a Java macro instruction corresponding to one or more Java Bytecode instructions, said method comprising:

- 5 reading a stream of Java Bytecode instructions;
- determining whether two or more Java Bytecode instructions in said Java Bytecode stream can be represented by one instruction;
- generating a Java macro instruction that represents said two or more Java Bytecode instructions when said determining determines that two or 10 more Java Bytecode instructions in said Java Bytecode stream can be represented by one instruction;
- wherein said Java macro instruction is suitable for execution by a Java virtual machine; and
- wherein, when executed, said Java macro instruction can operate to 15 perform one or more operations that are performed by said two or more Java Bytecode instructions.

2. A method as recited in claim 1,

- wherein said determining operates to determine whether a 20 predetermined sequence of two or more Java Bytecode instructions have been found.

3. A method as recited in claim 1, wherein said reading is performed during Java Bytecode verification by said virtual machine.

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4. A method as recited in claim 1, wherein said method further comprises:

replacing said two or more Java Bytecode instructions with said Java macro instruction, and

30 wherein said macro instruction is internally represented in said virtual machine.

5. A method as recited in claim 4, wherein said internal representation comprises a pair of streams.

6. A method as recited in claim 5,

5 wherein said pair of streams includes a code stream and a data stream,

wherein said code stream is suitable for containing a code portion of said Java macro instruction, and

10 wherein said data stream is suitable for containing a data portion of said Java macro instruction.

7. A method of generating a Java macro instruction corresponding to one or more Java Bytecode instructions, said method comprising:

reading a stream of Java Bytecode instructions;

15 counting the number of times a sequence of Java Bytecode instructions appears in said stream of Java Bytecode instructions, said sequence of Java Bytecode instructions including two or more Java Bytecode instructions which are in a sequence in said stream;

determining whether said sequence of Java Bytecode instructions 20 should be represented by one instruction;

generating a Java macro instruction that represents said sequence of Java Bytecode instructions when said determining determines that said sequence of Java Bytecode instructions can be represented by said one instruction;

25 wherein said Java macro instruction is suitable for execution by a Java virtual machine; and

wherein, when executed, said Java macro instruction can operate to perform one or more operations that are performed by said sequence of Java Bytecode instructions.

30 8. A method as recited in claim 7, wherein said determining of whether said sequence of Java Bytecode instructions should be represented by one

instruction operates to determine whether said sequence has been counted for at least a predetermined number of times.

9. A method as recited in claim 8, wherein said counting is performed  
5 during Bytecode verification.

10. A method as recited in claim 9, wherein said method further  
comprises:

replacing said two or more Java Bytecode instructions with said Java  
10 macro instruction, and

wherein said macro instruction is internally represented in said virtual  
machine.

11. A method as recited in claim 10, wherein said internal representation  
15 comprises a pair of streams.

12. A method as recited in claim 11,

wherein said pair of streams includes a code stream and a data  
stream,

20 wherein said code stream is suitable for containing a code portion of  
said Java macro instruction, and

wherein said data stream is suitable for containing a data portion of  
said Java macro instruction.

25 13. A method of generating a Java macro instruction corresponding to  
one or more Java Bytecode instructions, said method comprising:

reading a stream of Java Bytecode instructions during Java  
Bytecode verification;

determining whether two or more Java Bytecode instructions in said  
30 Java Bytecode stream can be represented by one instruction;  
generating a Java macro instruction that represents said two or more  
Java Bytecode instructions when said determining determines that two or

more Java Bytecode instructions in said Java Bytecode stream can be represented by one instruction;

wherein said Java macro instruction is suitable for execution by a Java virtual machine; and

5 wherein, when executed, said Java macro instruction can operate to perform one or more operations that are performed by said two or more Java Bytecode instructions.

14. A method as recited in claim 13,

10 wherein said determining operates to determine whether a predetermined sequence of two or more Java Bytecode instructions have been found.

15. A method as recited in claim 13,

15 wherein said method further comprises counting the number of times a sequence of Java Bytecode instructions appear in said stream, and

wherein said determining operates to determine whether a sequence has been counted for at least a predetermined number of times.

20 16. In a Java computing environment, a Java macro instruction generator suitable for generation of Java macro instructions,

wherein each Java macro instruction corresponds to one or more Java Bytecode instructions,

wherein said Java macro instruction generator operates to:

25 read a stream of Java Bytecode instructions during Java Bytecode verification;

determine whether two or more Java Bytecode instructions in said Java Bytecode stream can be represented by one instruction;

30 generate a Java macro instruction that represents said two or more Java Bytecode instructions when said determining determines that two or more Java Bytecode instructions in said Java Bytecode stream can be represented by one instruction;

wherein said Java macro instruction is suitable for execution by a Java virtual machine, and

wherein, when executed, said Java macro instruction can operate to perform one or more operations that are performed by said two or more  
5 Java Bytecode instructions.

17. A Java macro instruction generator as recited in claim 16, wherein said Java macro instruction generator operates during Java Bytecode verification.

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18. A Java macro instruction generator as recited in claim 16, wherein said Java macro instruction generator operates to determine whether a predetermined sequence of two or more Java Bytecode instructions has been found.

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19. A Java macro instruction generator as recited in claim 16,  
operating to replace said two or more Java Bytecode instructions with said Java macro instruction, and  
wherein said Java macro instruction is internally represented

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in said virtual machine.

20. A Java macro instruction generator as recited in claim 19, wherein said internal representation comprises a pair of streams.